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- (71) Applicant: **RECOT, INC.** [US/US]; 5000 Hopyard Road, Suite 460, Pleasanton, CA 94588 (US).
- (72) Inventor: **NEEL, Donald, Vaughn**; 2885 Woodhollow Drive, Highland Village, TX 75077 (US).
- (74) Agents: **NEWLAND, Bart, G.** et al.; Rothwell, Figg, Ernst & Manbeck, P.C., 555 13th Street, N.W., Suite 701-E, Washington, DC 20004 (US).
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(54) Title: **HIGHLY SEASONED SNACK CHIPS PRODUCTS AND PROCESS FOR MAKING THEM BY COATING WITH SEASONED OIL AND DRY SEASONING**

(57) Abstract: Dual-stage seasoned snack chips are prepared by providing a base snack chip, applying an oleaginous coating to the base chip and then adhering a dry seasoning material to the oleaginous coating. The oleaginous coating serves as a binder and adhesive for the dry seasoning material, as well as a source of flavor and other hedonistic properties such as "mouthfeel." The oil content of the base chip is pre-selected. The presence of two types of seasoning materials on a base chip having a pre-selected oil content results in a snack chip that provides intense flavor characteristics, excellent seasoning adhesion and a total oil content within a desirable range.

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HIGHLY SEASONED SNACK CHIPS PRODUCTS AND PROCESS FOR MAKING THEM BY COATING
WITH SEASONED OIL AND DRY SEASONING**BACKGROUND OF THE INVENTION**1. Technical Field

5 The present invention relates to highly seasoned snack chip products. More specifically, the present invention relates to highly seasoned snack chip products which comprise relatively large amounts of seasoning ingredients and thus exhibit strong seasoning flavors, and which also possess a desirable total oil content.

2. Description of the Background Art

10 Snack chip products, including potato chips (crisps) and tortilla chips, are popular with consumers throughout much of the world. Snack chips often are seasoned with salt and/or any of a wide variety of flavorful sweet or savory seasoning materials. Snack chips seasoned with barbeque, sour cream and onion, or cheese flavored seasonings are especially popular in the United States, but other flavors are equally popular among other cultures. Solid seasoning
15 materials typically are applied to fully cooked base chips (such unseasoned snack chips are referred to herein as "base" chips) in the form of a powdery or granular material or blend of materials. Although such solid seasoning materials often are referred to as "dry," such materials may include fats or oils. Technologies also exist for the application of seasoning materials in the form of viscous liquid oleaginous (oil-based) compositions.

20 Seasoned potato, tortilla and other snack chips are typically manufactured by first preparing the base chips (by frying in oil or baking) and then transporting the base chips to a seasoning apparatus. One conventional seasoning apparatus consists of a rotating drum (tumbler) that receives the base chips, with a seasoning dispensing apparatus mounted within the drum. An example of one such apparatus is disclosed in U.S. Patent No. 5,090,593, the entire
25 disclosure of which is incorporated by reference herein. The seasoning dispensing apparatus applies seasoning to the chips at a pre-determined rate as the chips are being tumbled within the drum. The tumbling action of the chips helps to distribute the seasoning material uniformly. Although providing a uniform coating of seasoning on both sides of each chip may be a goal of the snack chip producer, this is often difficult to attain.

30 Typically, dry powdery or granulated seasoning materials do not adhere especially well to the surface of base snack chip products. When the manufacturing process is properly designed, both oil on the surface of the chip and oil in the seasoning material itself can play roles in adhering the seasoning to the chip. In the case of base snack chips which are produced by frying,

for example, the chips may be removed from the frying oil and transported to the seasoning apparatus where the powdered or granulated seasoning composition comes into contact with oil remaining on the surface of the chip. Where the base snack chips are prepared by baking (dehydrating in hot air ovens) rather than frying, as is the case with baked tortilla chips or baked
5 fabricated potato crisps, oil may be applied to all or part of the surface of the base chips prior to the application of a seasoning material.

There is an upper limit to the amount of powdered or granular seasoning that can be applied and successfully retained on a snack chip. Once the surface layer of oil has been fully covered with a thin coating of dry seasoning, additional seasoning does not adhere well and the
10 practical limit is attained. Physical forces encountered during the tumbling action that is used to ensure uniform seasoning application limits the total amount of seasoning material that remains adhered to the chips. Snack chips are subjected to additional physical stresses downstream of the seasoning process, for example, during the typical form-fill-seal vertical bagmaker packaging process. These stresses can cause the seasoning to separate from the surface of the chip.

15 Additionally, the seasoning adhered to the surfaces of packaged snack chips may be physically stressed when the product is transported to the retail outlet, when the packages are loaded onto shelves or other display devices at the retail outlet and when the consumer transports the product home. During each of these times seasoning may separate from the snack chip and accumulate undesirably at the bottom of the package. The separation of seasoning from the chip reduces the
20 flavor of the chip and negatively impacts consumer acceptance of the product

Oil content is another factor that makes a significant contribution to the overall consumer acceptance of snack chip products. For health and weight control reasons consumers often desire to limit their total dietary intake of fats and oils. However, fats or oils play an important role in the texture and other so-called hedonic attributes of snack chips, such as "mouthfeel." Snack
25 chips with very low oil content often lack the hedonic attributes consumers expect and desire. Snack food chips with an excessive oil content can be perceived as undesirably "oily" or "greasy" by consumers. Maximizing the consumer acceptance of a snack food chip may require the manufacturer to balance the oil content of the product between these upper and lower boundaries.

To this end, technology has been developed in the potato chip industry to remove oil from
30 base chips. U.S. Patent No. 4,933,199 (Neel and Reed) discloses an apparatus and method for preparing low-oil potato chips. Base potato chips are removed from frying oil prior to reaching their final moisture content. The par-fried chips are contacted with superheated steam to physically remove oil from the surface of the base chips soon after frying. The processed base

chips have less than about 25% oil by weight. After the surface oil has been removed, the processed chips are finish-dried (dehydrated) in a hot air oven to a pre-determined final moisture content.

A need has existed for improved snack chip seasoning technologies. More specifically, a need has existed for improved snack chip seasoning technologies that would permit greater amounts of seasoning to be applied and securely adhered to each chip. The desired result of such technology is a snack chip that securely carries a relatively large amount of seasoning and thus presents a relatively strong seasoning flavor to the consumer. At the same time, however, the snack chip should have a total oil content within an acceptable range, and the seasoning should be securely adhered to the chip.

SUMMARY OF THE INVENTION

The foregoing needs have now been met successfully by the present invention.

In one aspect, the present invention provides a method for producing a highly seasoned snack chip having a desirable, pre-selected total oil content, comprising:

- (a) providing a base snack chip having a pre-determined oil content;
- (b) applying an oleaginous composition to the base chip to thereby produce an oil-coated base chip, said oleaginous composition comprising a seasoning material; and
- (c) adhering a dry seasoning material to the oil coated base chip to thereby produce a highly seasoned snack chip;

wherein the pre-determined oil content of said base snack chip is selected so as to inhibit said base snack chip from absorbing oil from said oleaginous composition, and wherein the highly seasoned snack chip has a total oil content of about 36% or less.

In a preferred aspect, the present invention provides a method for producing a highly seasoned snack chip having a desirable, pre-selected total oil content, comprising:

- (a) providing a base snack chip having an oil content of between about 22% and 30% by weight, based upon the total weight of the base chip;
- (b) applying an oleaginous composition to the base chip to thereby produce an oil-coated base chip, said oleaginous composition comprising a seasoning material; and
- (c) adhering a dry seasoning material to the oil coated base chip to thereby produce a highly seasoned snack chip;

wherein the total oil content of the seasoned snack chip is about 36% or less.

In another aspect, the present invention provides a highly seasoned snack chip comprising a base chip having an oil content between about 22% and 30% by weight; an oleaginous coating disposed upon the base chip, said oleaginous coating comprising a seasoning material; and a dry seasoning adhered to the oleaginous coating.

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DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

The present invention relates to highly seasoned snack chips that provide overall high levels of seasoning as well as total oil contents within desirable ranges.

The term "snack chip," as used herein, includes any of a wide variety of snacks food items that are commonly commercially available, including potato chips, fabricated potato chips which are manufactured from a potato-based flour, multigrain chips, corn chips and tortilla chips. Snack chips may be produced in a wide variety of shapes and sizes, inasmuch as the shape and size of the product are two factors that contribute to its overall consumer acceptability.

The present invention is not limited to the use of any specific type or form of seasoning, and the term "seasoning," as used herein, includes any of a wide variety of flavor imparting materials, including salt, materials that impart barbeque, sour cream and onion and cheese flavors, as well as materials that impart other flavors. Depending upon the manner in which the product is to be marketed, the seasoning may impart any desired flavor, including sweet, salty and savory flavors. The seasoning may be a processed form of a naturally occurring material, such as a dried spice, a processed cheese product, or an extract. Artificial seasonings also may be used.

The production of the highly seasoned snack chips according to the present invention includes the steps of (a) providing a base chip having a pre-selected oil content, (b) applying to the base chip an oleaginous composition that includes at least one seasoning material to thereby produce a flavored, oil-coated base chip intermediate, and (c) applying a seasoning material to the intermediate. The oil content of the base chip is pre-selected to inhibit oil absorption. This ensures that an undesirably large amount of oil from the oleaginous composition will not be absorbed by the base chip. Absorption of an excessive amount of oil can impair the ability of the oleaginous composition to serve, as is intended, as a binder for adhering the dry seasoning material to the base chip. Oil absorption also can effect the intended hedonic characteristics of the final product.

Representative examples of base chips which can be used in accordance with the present invention include base potato chips which have been produced by frying potato slices in oil; base

tortilla chips which have been produced by cutting chip-shaped pieces from a sheeted dough comprising corn masa or flour, following which the pieces are fried in oil or baked; and base fabricated potato chips which have been produced by cutting chip-shaped pieces from a sheeted dough comprising potato flour, following which the pieces are fried in oil or baked. Although
5 potato chips, tortilla chips and fabricated potato crisps are especially preferred due to their widespread consumer appeal, the invention is applicable to a wide variety of chips including fabricated chips prepared from other farinaceous doughs including, for example, wheat flour and/or rice flour, as well as chips prepared from other vegetables or fruits.

Base chips may be prepared by frying in oil obtained from vegetable and/or animal
10 sources, in non-nutritive oil such as olestra, or in blends thereof. A useful pre-determined oil content of the base chip will be selected based upon the composition of the base chip, the composition of the oleaginous material and the composition of the dry seasoning material so that the base chip will not absorb an amount of oil so as to impair the function of the oleaginous material as a binder/adhesive for the dry seasoning. Oil contents in the range of about 22% to
15 about 30% are preferred for base potato chips produced by frying potato slices in oil. For tortilla chips produced by frying in oil, an oil content in the range of about 20% +/- 2% is preferred.

In accordance with the present invention, an oleaginous, oil-based composition is applied to the base chip. The oleaginous material may include one or more oils from vegetable or animal sources, a non-nutritive oil such as olestra, or mixtures thereof. Notably, the oil(s) may be
20 different from the frying oil(s) used to prepare the base chip, thus imparting a novel oil flavor not available from the frying oil. Oils that are not suitable for commercial frying applications, such as virgin olive oil, avocado oil, sesame oil, walnut oil, and the like can be used by the process disclosed herein to impart a flavor not provided by commercial frying oils.

The oleaginous material preferably includes a seasoning (flavoring) component, thus
25 contributing to the seasoning flavor properties of the final product. The seasoning component may be a liquid, such as a flavor extract or concentrate, which can be dissolved in or otherwise blended with the oil component. Alternatively, the seasoning component may be a solid material, such as cheese food solids, that are blended with the oleaginous material to form a mixture such as a dispersion or slurry. The oleaginous material, when uniformly applied as a
30 coating to the surfaces of the base chip, serves as a source of flavor and "mouthfeel" properties. It also functions as a binder, promoting adhesion of a subsequently applied dry seasoning material to the base chip.

As mentioned earlier, it has been discovered that the oil content of the base chip plays an important role in determining the effectiveness of the oleaginous coating as a binder for the dry seasoning. If the oil content of the base chip is too low, the base chip can absorb oil from the oleaginous coating and thereby impair its ability to serve as a binder. The rate and extent of the migration of oil from the oleaginous coating to the base chip is effected, in part, by the relative oil concentrations in each. The optimal oil content of the base chip will vary, however, depending upon the components of the base chip, the oleaginous material and the dry seasoning, inasmuch as each component exhibits its own affinity (partition coefficient) for oil. In the case of certain preferred embodiments comprising potato chips fried in vegetable oil, the optimal oil content of the base chip is about 28% +/- 2% by weight, based upon the total weight of the base chip.

In preferred embodiments, the oleaginous material is an oil-based seasoning slurry. The oil component of the slurry can be selected from edible oils and fats obtained from vegetable or animal sources, non-nutritive oil such as olestra, or mixtures thereof. The seasoning component of the slurry can be any of a wide variety of known seasoning materials. Preferably the oil and seasoning components of the slurry will be pre-mixed in the desired proportion and held in a mixing tank as a suspension at an appropriate temperature under constant agitation (stirring).

Persons skilled in the field of snack food manufacturing will appreciate that there are numerous ways to apply the oleaginous material to the base chip. For example, the base chips can be transported via a conveyor system from the frying or baking apparatus to a conventional seasoning tumbler. The slurry is then sprayed onto the base chips using one or more nozzles that are appropriately placed near the entrance of the tumbler. U.S. patent no. 4,576,108, the entire disclosure of which is incorporated by reference herein, describes such a system. Agitation of the chips within the tumbler contributes to the even application of the oleaginous material. The application rate, location of the spray nozzles and spray pattern will be selected, along with the tumbler design and tumbler loading and operation parameters, to provide, ideally, uniform application of the slurry to all surfaces of each base chip. Alternatively, the oleaginous material may be sprayed onto base chips that are being transported on a conveyor belt system.

A dry seasoning material is then applied to the oil-coated chip intermediate. The dry seasoning application, or "dusting," of the oil-coated chips serves two purposes. First, the dry seasoning provides a second source of seasoning, thereby permitting the final product to provide better hedonic qualities, specifically a more intense seasoned flavor than conventional single-stage seasoned snack chips. The dry seasoning may impart flavors that are similar to the

seasoning component in the oleaginous material. The dry seasoning may also impart flavors that are not similar to the seasoning component in the oleaginous material. As an example, the oleaginous material may carry a barbeque flavoring component and the dry seasoning may comprise cheese solids providing a cheddar cheese flavor. In this way, a distinct two-flavor delivery system is provided. Second, the application of dry seasoning provides a dry outer surface for the snack chip as it exits the seasoning tumbler which makes the snack chip suitable for immediate further processing. Snack chips that receive only a slurry seasoning typically must be retained within the tumbler, or retained on a series of accumulating conveyors, for a period of time sufficient for the slurry to dry, prior to being transported to a packaging operation. The use of accumulating conveyors in potato chip production can be problematic, and the present invention provides a slurry-seasoned potato chip product while avoiding the use of accumulating conveyors.

Various apparatus useful for metering a desired amount of dry seasoning material onto the snack chips within the tumbler are well known. A conventional "seasoning snout" comprising an auger which rotates within a hollow tube may be installed within the seasoning tumbler, for example. The auger transports the dry seasoning material through the tube, and holes spaced apart along the length of the tube permit the seasoning to drop onto the chip bed. Seasoning material that has not exited through the holes is expelled from the open, distal end of the tube. Alternatively, the seasoning apparatus disclosed in U.S. patent no. 5,721,000, the entire disclosure of which is incorporated by reference herein, may be used.

In one particularly preferred embodiment, base chips are prepared from whole potatoes that are washed, peeled and sliced to produce slices having a ridged cross section and a thickness of approximately 0.068 inches. The slices are fried in vegetable oil until they possess a moisture content of about 2% by weight and an oil content of about 36% by weight. The slices are then transported to an oil stripper apparatus of the type disclosed in U.S. patent no. 4,933,199, the entire disclosure of which is incorporated by reference herein. The base chips are contacted with superheated steam to reduce their oil content to about 28% +/- 2% by weight. The base chips are then placed in a drying oven until their total moisture content is in the range of about 1.3% +/- 0.2% by weight.

The base chips are transported to a seasoning tumbler that has been outfitted with apparatus for applying the oleaginous composition and the dry seasoning material. A preferred oleaginous composition (seasoning slurry) is prepared by mixing from about 50% to 75% by

weight of an oil with from about 50% to 25% of a seasoning component and most preferably about 2 parts of an oil with about 1 part of a seasoning component.

5 A dry seasoning composition subsequently is dispensed onto the chip bed within the tumbler. The ratio of seasoning sourced from the oleaginous slurry to the dry seasoning ranges from about 70:30 to about 30:70 and preferably is about 50:50. Thus, a potato chip having a total seasoning amount of about 13% by weight will obtain 6.5% from the slurry seasoning and 6.5% from the dry seasoning.

Upon exiting the tumbler, the seasoned snack chip product is transported to suitable packaging equipment.

10 It is noted that snack chips having total seasoning in the range of about 12% to 14% by weight can be made by this invention and will retain such seasoning throughout its packaging and transport. Seasoned snack chips made by traditional methods are typically seasoned with from about 6% to 9% by weight of seasoning.

15 Although the invention has been described in connection with certain preferred embodiments, it is not so limited. Numerous modifications will be apparent to persons skilled in the field of snack food production.

CLAIMS

1. A method for producing a highly seasoned snack chip having a desirable, pre-selected total oil content, comprising:

- (a) providing a base snack chip having a pre-determined oil content;
- 5 (b) applying an oleaginous composition to the base chip to thereby produce an oil-coated base chip, said oleaginous composition comprising a seasoning material; and
- (c) adhering a dry seasoning material to the oil coated base chip to thereby produce a highly seasoned snack chip;

wherein the pre-determined oil content of said base snack chip is selected so as to inhibit

10 absorption of oil by said base snack chip from said oleaginous composition, and wherein the highly seasoned snack chip has a total oil content of about 36% or less.

2. The method according to claim 1, wherein said base snack chip is a potato chip, a tortilla chip or a fabricated potato crisp.

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3. The method according to claim 1, wherein said base snack chip is prepared by frying in oil obtained from an animal or vegetable source, by frying in non-nutritive oil, or by frying in a blend of oil obtained from an animal or vegetable source and a non-nutritive oil.

20 4. The method according to claim 3, wherein said non-nutritive oil is Olestra.

5. The method according to claim 1, wherein the base snack chip is a potato chip having an oil content between about 22 and 30 percent by weight.

25 6. The method according to claim 1, wherein the base snack chip is a potato chip having an oil content of about 28 +/- 2 percent by weight.

7. The method according to claim 1, wherein the base snack chip is a tortilla chip having an oil content of about 20 +/- 2 percent by weight.

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8. The method according to claim 1, wherein said oleaginous composition is comprised of an oil from an animal source, an oil from a vegetable source, or a non-nutritive oil.

9. The method according to claim 8, wherein said non-nutritive oil is Olestra.

10. The method according to claim 1, wherein said base snack chip is prepared by frying in oil and said oleaginous composition comprises an oil that was not used to prepare said base
5 snack chip.

11. The method according to claim 1, wherein said oleaginous composition is comprised of an oil that is not suitable for commercial frying applications.

10 12. The method according to claim 11, wherein said oil that is not suitable for commercial frying applications is selected from the group consisting of olive oil, avocado oil, sesame oil and walnut oil.

13. The method according to claim 1, wherein said oleaginous composition comprises a solid
15 seasoning material.

14. The method according to claim 13, wherein said solid seasoning material is cheese food solids.

20 15. The method according to claim 1, wherein said oleaginous composition is a slurry comprised of an oil component selected from the group of nutritive animal and vegetable oils and non-nutritive oils, and a solid seasoning material.

16. The method according to claim 1, wherein said seasoning material imparts a flavor that is
25 different than a flavor imparted by said dry seasoning material.

17. A highly seasoned snack chip comprising a base chip having an oil content between about 22% and 30% by weight; an oleaginous coating disposed upon the base chip, said oleaginous coating comprising a seasoning material; and a dry seasoning adhered to the oleaginous coating,
30 wherein the total oil content of the highly seasoned snack chip is about 36% by weight or less.

18. The snack chip according to claim 17, wherein said base chip is a potato chip, a tortilla chip or a fabricated potato crisp.

19. The snack chip according to claim 17 wherein said base chip is comprised of oil obtained from an animal or vegetable source, or a non-nutritive oil.

20. The snack chip according to claim 19, wherein said non-nutritive oil is Olestra.

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21. The snack chip according to claim 17, wherein the base chip is a potato chip having an oil content between about 22 and 30 percent by weight.

22. The method according to claim 17, wherein the base chip is a potato chip having an oil
10 content of about 28 +/- 2 percent by weight.

23. The snack chip according to claim 17, wherein the base chip is a tortilla chip having an oil content of about 20 +/- 2 percent by weight.

15 24. The snack chip according to claim 17, wherein said oleaginous coating is comprised of an oil from an animal source, an oil from a vegetable source, or a non-nutritive oil.

25. The snack chip according to claim 17, wherein the oleaginous coating is comprised of an oil that is not suitable for commercial frying applications.

INTERNATIONAL SEARCH REPORT

Intern Application No

PC1, 01/04338

A. CLASSIFICATION OF SUBJECT MATTER

IPC 7 A23L1/164 A23L1/217 A23P1/08

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC 7 A23L A23P

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

WPI Data, PAJ, EPO-Internal, FSTA

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	EP 0 482 709 A (PROCTER & GAMBLE) 29 April 1992 (1992-04-29) column 5, line 20 - line 22 column 8, line 45 - column 9, line 13	1, 2, 5-8, 11, 16-19, 21-25
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☒ Further documents are listed in the continuation of box C.☒ Patent family members are listed in annex.

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X document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

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Date of the actual completion of the international search

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European Patent Office, P.B. 5818 Patentlaan 2
NL - 2280 HV Rijswijk
Tel (+31-70) 340-2040, Tx 31 651 epo nl,
Fax (+31-70) 340-3016

Authorized officer

Vuillamy, V

INTERNATIONAL SEARCH REPORT

Inter I Application No
PC., 01/04338

C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

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